Towards 5G

Applications, Requirements & Candidate Technologies

Edited by
Rath Vannithamby • Shilpa Talwar

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APPLICATIONS, REQUIREMENTS AND CANDIDATE TECHNOLOGIES

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List of Acronyms

Chapter 1

1G	First Generation
2G	Second Generation
3G	Third Generation
4G	Fourth Generation
5G	Fifth Generation
CDMA	Code Division Multiple Access
TDMA	Time Division Multiple Access
OFDMA	Orthogonal Frequency Division Multiple Access
GSM	Global System for Mobile communications
IMT	International Mobile Telecommunications
ITU-R	International Telecommunication Union-Radio
WCDMA	Wideband CDMA
3GPP	Third Generation Partnership Project
HSPA	High Speed Packet Access
LTE	Long-Term Evolution
FDMA	Frequency Division Multiple Access
SC-FDMA	Single Career Frequency Division Multiple Access
M2M	Machine to Machine communications
IoT	Internet of Things
QoE	Quality of Experience
RAT	Radio Access Technology
MIMO	Multiple Input Multiple Output
SDN	Software Defined Network
NFV	Network Function Virtualization

Chapter 2

5GMF	5G Mobile Communications Promotion Forum
NGMN	Next Generation Mobile Networks
D2D	Device to Device
FHD	Full High Definition
UHD	Ultra High Definition
V2V	Vehicle-to-Vehicle
C2C	Car-to-Car
V2I	Vehicle-to-Road Infrastructure
C2P	Car-to-Pedestrian
V2D	Vehicle-to-Device
BYOD	Bring Your Own Device
SoLoMo	Social Local Mobile
HMI	Human-Machine Interface
CAGR	Compound Annual Growth Rate
WRC	World Radio Conference
AR	Augmented Reality
RTT	Round Trip Time
TTI	Transmission Time Interval
HARQ	Hybrid Automatic Repeat reQuest

Chapter 3

3GPP	3rd Generation Partnership Project
BS	Base Station
D2D	Device to Device
DL	Downlink
EE	Energy Efficiency
EEC	European Economic Union
EFTA	European Free Trade Association
EP	European Parliament
ETP	European Technology Platform
ETSI	European Telecommunications Standards Institute
EU	European Union
HetNet	Heterogeneous network
ICT	Information and Communication Technology
IST	Information Society Technology
LTE	Long-Term Evolution
LTE-A	Long-Term Evolution-Advanced
LSA	Licensed Shared Access
MIMO	Multiple Input Multiple Output
MTC	Machine Type Communication
PPP	Public Private Partnership
QoS	Quality of Service

RAT	Radio Access Technology
TDMA	Time-Division Multiple Access
UE	User Equipment
UL	Uplink
UMTS	Universal Mobile Telecommunications System

Chapter 4

ISRA	Intel Strategic Research Alliance
NTIA	National Telecommunications and Information Association
GHz	Gigahertz
THz	Terahertz
Gbps	Gigabits per second
MIMO	Multi Input Multi Output
MU-MIMO	Multi-User MIMO
VLM	Very Large MIMO
CP	Cyclic Prefix
OFDM	Orthogonal Frequency Division Multiplexing
RAN	Radio Access Network
RAT	Radio Access Technology
WAN	Wide Area Network
LAN	Local Area Network
PAN	Personal Area Network
IoT	Internet of Things
QoE	Quality of Experience
QoS	Quality of Service
RFP	Request For Proposals
OTT	Over-The-Top
ARQ	Automatic Repeat reQuest
PHY	Physical Layer
FFR	Fractional Frequency Reuse
LSA	Licensed Shared Access
REM	Radio Environment Map
PC	Personal Computer
GNU	GNUs Not Unix

Chapter 5

SE	Spectral Efficiency
EE	Energy Efficiency
LSAS	Large Scale Antenna System
NOMA	Non Orthogonal Multiple Access
C-RAN	Cloud Radio Access Network
ICT	Information and Communications Technologies

MTC	Machine Type Communications
QoS	Quality of Service
MAC	Medium Access Control
PA	Power Amplifier
CSI	Channel State Information
TDD	Time Division Duplex
FDD	Frequency Division Duplex
UDN	Ultra Dense Network
DAS	Distributed Antenna System
CoMP	Coordinated Multi-Point
IM	Instant Messaging
LAPI	Low Access Priority Indication
RRC	Radio Resource Control

Chapter 6

SCN	Small Cell Network
UT	User Terminal
ICIC	Inter-Cell Interference Coordination
TTT	Time to Trigger
SINR	Signal-to-Interference-plus-Noise Ratio
OPEX	Operational Expenditures
CF	Collaborative Filtering
SVD	Singular Value Decomposition
CDN	Content Delivery Network
ICN	Information Centric Networks
MAB	Multi-Armed Bandit
ADMM	Alternating Direction Method of Multipliers
DMT	Diversity-Multiplexing Tradeoff
SNR	Signal-to-Noise Ratio
PPP	Poisson Point Process

Chapter 7

D2D	Device-to-Device
QoS	Quality of Service
RAT	Radio Access Technology
UE	User Equipment
HetNets	Heterogeneous Networks
WLAN	Wireless Local Area Network
3GPP	Third Generation Partnership Project
UMTS	Universal Mobile Telecommunications System
LTE	Long-Term Evolution
RAN	Radio Access Network
ANDSF	Access Network Discovery and Selection Function

SINR	Signal-to-Interference-plus-Noise Ratio
DL	Downlink
UL	Uplink
MIMO	Multiple Input Multiple Output
PPP	Poisson Point Process
AP	Access Point
BS	Base Station
MP	Maximum Power
FU	Full Utilization
SNR	Signal-to-Noise Ratio
SLS	System Level Simulator

Chapter 8

LTE-A	Long-Term Evolution-Advanced
ABS	Almost Blank Subframe
RB	Resource Block
CSI	Channel State Information

Chapter 9

D2D	Device-Device
FCC	Federal Communications Commission
V2V	Vehicle to Vehicle
D2I	Device-to-Infrastructure
RMS	Root Mean Square
GSCM	Geometry-based Stochastic Channel Model
BS	Base Station
MAC	Medium Access Control
DVCS	Directional Virtual Carrier Sensing
DCF	Distributed Coordinated Function
CS	Compressed Sensing
ZC	Zhadoff–Chu
CSI	Channel State Information
TDMA	Time Division Multiple Access
CSMA/CS	Carrier Sense Multiple Access with Collision Sensing
LATS	Location Aware Training Scheme
NMSE	Normalized Mean Square Error
QoS	Quality of Service
SINR	Signal-to-Interference-plus-Noise Ratio
SNR	Signal-to-Noise Ratio
SIR	Signal-to-Interference ratio
INR	Interference-to-Noise Ratio
PPP	Poisson Point Processes
MINLP	Mixed-Integer Nonlinear Programming

NE	Nash Equilibrium
PSO	Particle Swarm Optimization
OFDMA	Orthogonal Frequency Division Multiple Access
FDMA	Frequency Division Multiple Access
ITIS	Information-Theoretic Independent Sets
CU	Cellular User
ZF	Zero-Forcing
MC	Mobile Cloud
PCH	Primary Cluster Head
SCH	Secondary Cluster Head
MR-D	Maximum Rate towards Destination
RTS	Request To Send
CTS	Clear To Send
SIB	System Information Block
QoE	Quality of Experience

Chapter 10

OFDM	Orthogonal Frequency Division Multiplexing
OFDMA	Orthogonal Frequency Division Multiple Access
EE	Energy Efficiency
QoS	Quality of Service
AWGN	Additive White Gaussian Noise
DOF	Degree(s) of Freedom
SE	Spectral Efficiency
CSI	Channel State Information
CNR	Channel gain to Noise Ratio
LDD	Lagrange Dual Decomposition
MDSA	Maximum Downlink Subcarrier Assignment
MUSA	Maximizing Uplink Subcarrier Assignment
BPA	Bisection Power search Algorithm
LT	Luby Transform
MIMO	Multiple Input Multiple Output
PA	Power Amplifier

Chapter 11

MIMO	Multiple Input Multiple Output
SV-MIMO	Smart Vertical MIMO
SIMO	Single Input Multiple Output
NOMA	Non-Orthogonal Multiple Access
FDMA	Frequency Division Multiple Access
TDMA	Time Division Multiple Access
CDMA	Code Division Multiple Access
OFDMA	Orthogonal Frequency Division Multiple Access

SDMA	Spatial Division Multiple Access
OMA	Orthogonal Multiple Access
LTE	Long-Term Evolution
SU-MIMO	Single User MIMO
MU-MIMO	Multi-User MIMO
RAT	Radio Access Technology
ICIC	Inter-Cell Interference Coordination
CoMP	Coordinated Multi-Point
IRC	Interference Rejection Combining
MMSE	Minimum Mean Squared Error
NAICS	Network-Assisted Interference Cancellation and Suppression
MLD	Maximum Likelihood Detection
SIC	Successive Interference Cancellation
AAS	Active Antenna System
FD-MIMO	Full Dimensional MIMO
LOS	Line-Of-Sight
NLOS	Non Line-Of-Sight
SINR	Signal to Interference plus Noise Ratio
BS	Base Station
UE	User Equipment
AWGN	Additive White Gaussian Noise
CSI	Channel State Information
CQI	Channel Quality Indicator
SLIC	Symbol-Level Interference Cancellation
CWIC	Codeword Level Interference Cancellation
LLR	Log-Likelihood Ratio
MRC	Maximal Ratio Combining
BLER	Block Error Rate
RS	Reference Signal
C-RS	Common Reference Signal
UE-RS	UE-specific Reference Signal
SCM	Spatial Channel Model
HARQ	Hybrid Automatic Repeat reQuest
MCS	Modulation and Coding Scheme
MCPS	Modulation, Coding, and Power Set
TPA	Transmit Power Allocation
FSPA	Full Search Power Allocation
SFBC	Space Frequency Block Coding
CDD	Cyclic Delay Diversity
CRS	Cell Specific Reference Signal
BF	Beamforming
BB	Base-Band
PSS	Primary Synchronization Signal
SSS	Secondary Synchronization Signal
PDCCH	Physical Downlink Control Channel
EPDCCH	Enhanced PDCCH

PBCH	Physical Broadcast Channel
PDSCH	Physical Downlink Shared Channel
DM-RS	Demodulation Reference Signal
MS	Mobile Station

Chapter 12

RFID	Radio Frequency Identification
EDGE	Enhanced Data rates for GSM Evolution
RAN	Radio Access Network
UE	User Equipment
BS	Base Station
MME	Mobility Management Entity
PLMN	Public Land Mobile Network
EAB	Extended Access Barring
ACB	Access Class Barring
eNB	Evolved Node B (base station)
RF	Radio Frequency
PMU	Power Management Unit
BOM	Bill of Material
FFT	Fast Fourier Transform
TBS	Transport Block Size
PRACH	Physical Random Access Channel
PUSCH	Physical Uplink Shared Channel
PUCCH	Physical Uplink Control Channel
PDSCH	Physical Downlink Shared Channel
PBCH	Physical Broadcast Channel
EPDCCH	Enhanced Physical Downlink Control Channel
PSS	Primary Synchronization Signal
SSS	Secondary Synchronization Signal
MIB	Master Information Block
SIB	System Information Blocks
MCL	Maximum Coupling Loss
PRB	Physical Resource Block
NB	Narrow-Band
NB-IoT	Narrow-Band Internet of Things
TDM	Time Division Multiplexing

Chapter 13

PHY	Physical layer
HARQ	Hybrid Automatic Repeat reQuest
AIC	Advanced Interference Cancellation
LOS	Line Of Sight
NLOS	Non Line Of Sight

CP	Cyclic Prefix
GP	Guard Period
TA	Timing Alignment
Tx	Transmission
Rx	Reception
WLAN	Wireless Local Area Network
FCC	Federal Communications Commission
BF	Beam-Forming
CRS	Common Reference Symbol
DLCRS	Downlink Common Reference Symbol
DLCCH	Downlink Control Channels
ACK	Acknowledgement
DLSCH	Downlink Shared Channel
DMRS	Demodulation Reference Symbols
ULCRS	Uplink Common Reference Symbols
ULSCH	Uplink Shared Channel
ULDCH	Uplink Data Channel
RACH	Random Access Channel
ULCCH	Uplink Control Channel
MCS	Modulation and Coding Scheme

Chapter 14

PHY	Physical layer
DFT	Discrete Fourier Transform
MTC	Machine-Type Communication
IoT	Internet of Things
RACH	Random Access Channel
CoMP	Coordinated Multi-Point
CP	Cyclic Prefix
CS	Cyclic Suffix
FBMC	Filter Bank Multi-Carrier
TTI	Transmission Time Interval
ICI	Inter-Carrier Interference
GI	Guard Interval
ISI	Inter-Symbol Interference
IDMA	Interleave-Division Multiple Access
PRACH	Physical Layer Random Access Channel
D-PRACH	Data PRACH
ATA	Autonomous Timing Advance
OFDM	Orthogonal Frequency Division Multiplexing
UFMC	Universal Filtered Multi-Carrier (also UF-OFDM)
FFT	Fast Fourier Transform
IFFT	Inverse Fast Fourier Transform
QAM	Quadrature Amplitude Modulation